

**Report Date:** 27 Jan 2015

**Summary Report for Individual Task**  
**551-8ST-8156**  
**Compute Fuel Consumption**  
**Status: Approved**

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**Distribution Restriction:** Approved for public release; distribution is unlimited.

**Destruction Notice:** None

**Foreign Disclosure: FD7** - This product/publication has been reviewed by the product developers in coordination with the Transportation School, Fort Lee, VA 23801 foreign disclosure authority.

This product is NOT releasable to students from foreign countries.

**Condition:** Assigned as a Marine Engineering or Deck Officer given the requirement to compute fuel consumption, a completed risk assessment, a vessel in port or at sea, all applicable publications, forms, records, tools, materials, personnel, and equipment, in all weather conditions, day or night and all MOPP levels in an operational environment. Some iterations of this task should be performed in MOPP 4.

**Standard:** Compute the fuel consumption of the prescribed piece of equipment per the applicable technical publication's procedures and specifications. Comply with all Warnings, Cautions, and Notes listed in the applicable references. Once the task is completed make all entries on all forms and records without error.

**Special Condition:** None

**Safety Risk:** Low

**MOPP 4:** Sometimes

<b>Task Statements</b>
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**Cue:** You are required to compute fuel consumption.

**DANGER**

None

**WARNING**

None

**CAUTION**

None

**Remarks:** None

**Notes:** All required references and technical manuals will be provided by the local Command

## Performance Steps

### 1. Identify constants and symbols used to compute fuel consumption.

#### a. Constants:

Fuel - barrels, gallons, or tons

Distance - nautical miles

Speed - nautical miles per hour

RPM - engine rotations per minute

#### b. Symbols:

S = new speed in knots

s = old speed in knots

F = new fuel in barrels, gallons, or tons

f = old fuel in barrels, gallons, or tons

D = new distance in nautical miles

d = old distance in nautical miles

R = new RPM

r = old RPM

Note: In equations, new numbers and terms are symbolized by capital letters; old numbers and terms are symbolized by lower case letters.

### 2. Identify the formulas for computing speed, distance, engine RPM, and fuel.

a. Speed:  $S = s^2 \times d / D$

b. Distance:  $D = s^2 \times d \times F / S^2 \times f$

c. RPM:  $R = r^3 \times F / f$

d. Fuel:  $F = S^3 \times f / s^3$

e. Speed:  $S = r^3 \times F / f$

Note: See below for the same formulas for speed, distance, RPM and fuel written in a different format.

c. Formulae:

$$\begin{aligned} (1) \quad S &= \frac{\sqrt{s^2 \times d}}{D} \\ (2) \quad D &= \frac{s^2 \times d \times F}{S^2 \times f} \\ (3) \quad R &= \frac{\sqrt[3]{r^3 \times F}}{f} \\ (4) \quad F &= \frac{S^3 \times f}{s^3} \\ (5) \quad S &= \frac{\sqrt[3]{s^3 \times F}}{f} \end{aligned}$$

3. Calculate fuel consumption involving nautical speed, distance, engine RPM, and fuel.

(Asterisks indicates a leader performance step.)

**Evaluation Guidance:** Mark each performance measure either GO or NO GO. Mark the Soldier GO if all performance measures are met. All measures must be marked GO to receive an overall GO on the task. Mark the Soldier NO GO if any performance measure is not met. If the soldier is marked a NO GO, inform the Soldier what was done incorrectly and how to perform the task to standard.

**Evaluation Preparation:** Ensure that all required equipment to perform this task is available. Tell the soldier that he/she will be evaluated on computing fuel consumption.

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Identified constants and symbols used to compute fuel consumption.			
2. Identified the formulas for computing speed, distance, engine RPM, and fuel.			
3. Calculated fuel consumption involving nautical speed, distance, engine RPM, and fuel.			

**Supporting Reference(s):**

Step Number	Reference ID	Reference Name	Required	Primary
	MMOH	MERCHANT MARINE OFFICER's HANDBOOK 4th Ed	No	No

**Environment:** Environmental protection is not just the law but the right thing to do. It is a continual process and starts with deliberate planning. Always be alert to ways to protect our environment during training and missions. In doing so, you will contribute to the sustainment of our training resources while protecting people and the environment from harmful effects. Refer to FM 3-34.5 Environmental Considerations and GTA 05-08-002 ENVIRONMENTAL-RELATED RISK ASSESSMENT.

AR 200-1 delineates TRADOC responsibilities to integrate environmental requirements across DOTMLPF and ensures all training procedures, training manuals, and training doctrine includes sound environmental practices and considerations. The Army's environmental vision is to be a national leader in environmental and natural resource stewardship for present and future generations as an integral part of all Army missions. Environmental protection is never completed. Continuously be alert to ways to protect our environment and reduce waste.

Leaders must ensure that their unit has an active and strong environmental program. They must understand the laws and know what actions to take. Leaders bring focus, direction, and commitment to environmental protection. Commanding officers should ensure the following environmental programs are in place and are being maintained:

- Hazardous materials program.
- Hazardous waste program.
- Hazardous communications program.
- Pollution prevention and hazardous waste minimization recycling program.
- Spill prevention and response plan program.

**Safety:** In a training environment, leaders must perform a risk assessment in accordance with ATP 5-19, Risk Management. Leaders will complete the current Deliberate Risk Assessment Worksheet in accordance with the TRADOC Safety Officer during the planning and completion of each task and sub-task by assessing mission, enemy, terrain and weather, troops and support available-time available and civil considerations, (METT-TC). Note: During MOPP training, leaders must ensure personnel are monitored for potential heat injury. Local policies and procedures must be followed during times of increased heat category in order to avoid heat related injury. Consider the MOPP work/rest cycles and water replacement guidelines IAW FM 3-11.4, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection, FM 3-11.5, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination.

All operations will be performed to protect and preserve Army personnel and property against accidental loss. Procedures will provide for public safety incidental to Army operations and activities and safe and healthful workplaces, procedures, and equipment. Observe all safety and/or environment precautions regarding electricity, cable, and lines. Provide ventilation for exhaust fumes during equipment operation and use hearing protection when required IAW AR 385-10, the Clean Air Act (CAA) and the CAA amendments, and the OSHA Hazard Communication standard.

Accidents are an unacceptable impediment to Army missions, readiness, morale, and resources. Decision makers at every level will employ risk management approaches to effectively preclude unacceptable risk to the safety of personnel and property affiliated with this task. (a) Take personal responsibility. (b) Practice safe operations. (c) Recognize unsafe acts and conditions. (d) Take action to prevent accidents. (e) Report unsafe acts and conditions.

**Prerequisite Individual Tasks :** None

**Supporting Individual Tasks :** None

**Supported Individual Tasks :** None

**Supported Collective Tasks :** None